

REMARKS

Claims 1-51 were originally filed in the present application. No claims are currently canceled or added. Consequently, claims 1-51 remain pending in the present application.

Reconsideration of the present application in light of the above amendments and the following remarks is respectfully requested.

Information Disclosure Statement Correction

The Examiner has indicated that U.S. Publication Document No. 2002027563 has not been considered because the document number was incorrectly cited on the IDS submitted on May 16, 2005. Accordingly, an additional IDS is submitted concurrently herewith, correctly citing the document as U.S. Publication Document No. 20020027563. Applicants appreciate the Examiner's diligence in bringing this inadvertent error to their attention.

Rejections under 35 U.S.C. §102**Claim 1**

Claim 1 recites:

1. A method of extracting isosurface data from hierarchical node data, comprising:

providing hierarchical node data representing an object, the hierarchical node data including a lowest hierarchy level having a plurality of leaf nodes and a plurality of higher hierarchy levels each having a plurality of non-leaf nodes each encompassing ones of the plurality of leaf nodes;

determining a plurality of leaf node splats each corresponding to one of the plurality of leaf nodes that includes a portion of an isosurface, each of the plurality of leaf node splats based on scalar data corresponding to at least one of the plurality of leaf nodes; and

determining a plurality of non-leaf node splats each corresponding to one of the plurality of non-leaf nodes that includes a portion of the isosurface, each of the plurality of non-leaf node splats based on a plurality of splats each corresponding to a lower hierarchical node.

Claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by Jane Wilhelms & Allen Van Gelder, *Octrees for Faster Isosurface Generation*, vol. 11, no. 3, ACM TRANSACTIONS ON GRAPHICS, 201 (1992), herein referred to as “Wilhelms.”

The PTO provides in MPEP §2131 that:

“[t]o anticipate a claim, the reference must teach every element of the claim....”

Therefore, to sustain this rejection with respect to claim 1, Wilhelms must contain all of the above claimed elements of the claim. However, Wilhelms does not disclose determining splats in the context of claim 1, whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats of lower hierarchy, or otherwise. Accordingly, the §102 rejection of claim 1 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 1 and its dependent claims.

The Examiner points to pages 205 and 209 of Wilhelms as allegedly disclosing splats in the context of claim 1. However, neither of these pages (nor any other page in Wilhelms) discloses splats. As provided in paragraph [0006] of the present application, splats are computer-generated disks each having a radius, center and normal unit vector, such that solid model surfaces may be collectively represented by a large number of splats corresponding to points on or portions of the surfaces. Wilhelms fails to make any mention of such splats.

Wilhelms discloses on page 205 that a popular method for isosurface generation is to imagine the volume as consisting of cells whose corners are the sample values. Each cell is examined one by one for the presence of an isosurface, which is detected when at least one corner value is above and another below the threshold value. If the isosurface intersects the cell, intersection points along the cell edges are calculated and become the vertices of polygons representing the portion of the isosurface within that cell. However, such polygons (constructed from the intersection points along the edges of cells that are intersected by the isosurface) are not splats. For example, the polygons are not disks each having a radius, center and normal unit

vector. Thus, the passage on page 205 of Wilhelms to which the Examiner refers clearly fails to disclose splats, whether in the context of claim 1 of the present application or otherwise.

Wilhelm discloses on page 209 that Globus reports a variation of the even-subdivision strategy that addresses storage space issues. In the variation, a coarser granularity is accepted in that an octree node that covers less than 32 cells is not further subdivided. Nodes that cover small but very oblong regions are divided four or eight times in the longest dimension but not divided in one or both of the shorter dimensions. However, this passage to which the Examiner refers also clearly fails to disclose splats, whether in the context of claim 1 of the present application or otherwise.

Accordingly, as explained above, Wilhelms fails to teach each and every element of claim 1, such that the §102 rejection of claim 1 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 1 and its dependent claims.

Claim 20

Claim 20 recites:

20. A method of rendering isosurface data, comprising:
 providing hierarchical node data representing an object having an isosurface, the hierarchical node data including a lowest hierarchy level having a plurality of leaf nodes and a plurality of higher hierarchy levels each having a plurality of non-leaf nodes each encompassing ones of the plurality of leaf nodes;
 determining a plurality of leaf node splats each corresponding to one of the plurality of leaf nodes that includes a portion of an isosurface, each of the plurality of leaf node splats based on scalar data corresponding to at least one of the plurality of leaf nodes;
 determining a plurality of non-leaf node splats each corresponding to one of the plurality of non-leaf nodes that includes a portion of the isosurface, each of the plurality of non-leaf node splats based on a plurality of splats each corresponding to a lower hierarchical node; and
 rendering a plurality of splats partially populating a splat hierarchy resulting from the determination of the pluralities of leaf node splats and non-leaf node splats.

Claim 20 was also rejected under 35 U.S.C. §102(b) as being anticipated by Wilhelms. Therefore, to sustain this rejection, Wilhelms must contain all of the above elements recited in claim 20. However, in much the same manner as described above with regard to claim 1, Wilhelms does not disclose determining splats in the context of claim 20, whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats of lower hierarchy, or otherwise. Similarly, and necessarily in view of the above, Wilhelms also fails to disclose rendering a plurality of splats partially populating a splat hierarchy resulting from determination of pluralities of leaf node splats and non-leaf node splats. Accordingly, the §102 rejection of claim 20 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 20 and its dependent claims.

Claim 26

Claim 26 recites:

26. A processing system for extracting isosurface data from hierarchical node data, comprising:

means for providing hierarchical node data representing an object, the hierarchical node data including a lowest hierarchy level having a plurality of leaf nodes and a plurality of higher hierarchy levels each having a plurality of non-leaf nodes each encompassing ones of the plurality of leaf nodes;

means for determining a plurality of leaf node splats each corresponding to one of the plurality of leaf nodes that includes a portion of an isosurface, each of the plurality of leaf node splats based on scalar data corresponding to at least one of the plurality of leaf nodes; and

means for determining a plurality of non-leaf node splats each corresponding to one of the plurality of non-leaf nodes that includes a portion of the isosurface, each of the plurality of non-leaf node splats based on a plurality of splats each corresponding to a lower hierarchical node.

Claim 26 was also rejected under 35 U.S.C. §102(b) as being anticipated by Wilhelms. Therefore, to sustain this rejection, Wilhelms must contain all of the above elements recited in claim 26. However, in much the same manner as described above with regard to claims 1 and 20, Wilhelms does not disclose means for determining splats in the context of claim 26, whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats of lower hierarchy, or otherwise. Accordingly, the §102 rejection of claim 26 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 26 and its dependent claims.

Claim 30

Claim 30 recites:

30. A processing system for rendering isosurface data, comprising:
means for providing hierarchical node data representing an object, the
hierarchical node data including a lowest hierarchy level having a plurality of leaf
nodes and a plurality of higher hierarchy levels each having a plurality of non-leaf
nodes each encompassing ones of the plurality of leaf nodes;
means for determining a plurality of leaf node splats each corresponding to
one of the plurality of leaf nodes that includes a portion of an isosurface, each of
the plurality of leaf node splats based on scalar data corresponding to at least one
of the plurality of leaf nodes;
means for determining a plurality of non-leaf node splats each
corresponding to one of the plurality of non-leaf nodes that includes a portion of
the isosurface, each of the plurality of non-leaf node splats based on a plurality of
splats each corresponding to a lower hierarchical node; and
means for rendering a plurality of splats partially populating a splat
hierarchy resulting from the determination of the pluralities of leaf node splats and
non-leaf node splats.

Claim 30 was also rejected under 35 U.S.C. §102(b) as being anticipated by Wilhelms. Therefore, to sustain this rejection, Wilhelms must contain all of the above elements recited in claim 30. However, in much the same manner as described above with regard to claims 1, 20 and 26, Wilhelms does not disclose means for determining splats in the context of claim 30,

whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats of lower hierarchy, or otherwise. Similarly, and necessarily in view of the above, Wilhelms also fails to disclose means for rendering a plurality of splats partially populating a splat hierarchy resulting from determination of pluralities of leaf node splats and non-leaf node splats. Accordingly, the §102 rejection of claim 30 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 30 and its dependent claims.

Claim 36

Claim 36 recites:

36. A program product, comprising:
a computer-readable storage medium;
means recorded on the medium for providing hierarchical node data representing an object, the hierarchical node data including a lowest hierarchy level having a plurality of leaf nodes and a plurality of higher hierarchy levels each having a plurality of non-leaf nodes each encompassing ones of the plurality of leaf nodes;
means recorded on the medium for determining a plurality of leaf node splats each corresponding to one of the plurality of leaf nodes that includes a portion of an isosurface, each of the plurality of leaf node splats based on scalar data corresponding to at least one of the plurality of leaf nodes; and
means recorded on the medium for determining a plurality of non-leaf node splats each corresponding to one of the plurality of non-leaf nodes that includes a portion of the isosurface, each of the plurality of non-leaf node splats based on a plurality of splats each corresponding to a lower hierarchical node.

Claim 36 was also rejected under 35 U.S.C. §102(b) as being anticipated by Wilhelms. Therefore, to sustain this rejection, Wilhelms must contain all of the above elements recited in claim 36. However, in much the same manner as described above with regard to claims 1, 20, 26 and 30, Wilhelms does not disclose means recorded on a computer-readable storage medium for determining splats in the context of claim 36, whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats

of lower hierarchy, or otherwise. Accordingly, the §102 rejection of claim 36 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 36 and its dependent claims.

Claim 42

Claim 42 recites:

42. A program product, comprising:
 - a computer-readable storage medium;
 - means recorded on the medium for providing hierarchical node data representing an object, the hierarchical node data including a lowest hierarchy level having a plurality of leaf nodes and a plurality of higher hierarchy levels each having a plurality of non-leaf nodes each encompassing ones of the plurality of leaf nodes;
 - means recorded on the medium for determining a plurality of leaf node splats each corresponding to one of the plurality of leaf nodes that includes a portion of an isosurface, each of the plurality of leaf node splats based on scalar data corresponding to at least one of the plurality of leaf nodes;
 - means recorded on the medium for determining a plurality of non-leaf node splats each corresponding to one of the plurality of non-leaf nodes that includes a portion of the isosurface, each of the plurality of non-leaf node splats based on a plurality of splats each corresponding to a lower hierarchical node; and
 - means recorded on the medium for rendering a plurality of splats partially populating a splat hierarchy resulting from the determination of the pluralities of leaf node splats and non-leaf node splats.

Claim 42 was also rejected under 35 U.S.C. §102(b) as being anticipated by Wilhelms. Therefore, to sustain this rejection, Wilhelms must contain all of the above elements recited in claim 42. However, in much the same manner as described above with regard to claims 1, 20, 26, 30 and 36, Wilhelms does not disclose means recorded on a computer-readable storage medium for determining splats in the context of claim 42, whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats of lower hierarchy, or otherwise. Similarly, and necessarily in view of the above, Wilhelms also fails to disclose means recorded on a computer-readable storage medium for

rendering a plurality of splats partially populating a splat hierarchy resulting from determination of pluralities of leaf node splats and non-leaf node splats. Accordingly, the §102 rejection of claim 42 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 42 and its dependent claims.

Claim 51

Claim 51 recites:

51. A method of extracting isosurface data from a scalar field, comprising:

 providing scalar field data; and

 building a splat hierarchy, including:

 determining a plurality of leaf node splats each corresponding to one of the plurality of leaf nodes that includes a portion of an isosurface, each of the plurality of leaf node splats based on scalar data corresponding to at least one of the plurality of leaf nodes; and

 determining a plurality of non-leaf node splats each based on a plurality of lower hierarchical splats.

Claim 51 was also rejected under 35 U.S.C. §102(b) as being anticipated by Wilhelms. Therefore, to sustain this rejection, Wilhelms must contain all of the above elements recited in claim 51. However, in much the same manner as described above with regard to claims 1, 20, 26, 30, 36 and 42, Wilhelms disclose neither a splat hierarchy nor determining splats in the context of claim 51, whether with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, splats based on other splats of lower hierarchy, or otherwise. Accordingly, the §102 rejection of claim 51 is not supported by Wilhelms. Consequently, Applicants respectfully request the Examiner withdraw the §102 rejection of claim 51 and its dependent claims.

Rejections Under 35 U.S.C. §103

Claims 7, 18, 28, 39-41 and 48-50 were rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent No. 6,279,007 to Uppala (“Uppala”) in view of Chun-Fa Chang, et al., *LDI Tree: A Hierarchical Representation for Image-Based Rendering*, INTERNATIONAL CONFERENCE ON COMPUTER GRAPHICS AND INTERACTIVE TECHNIQUES, 291 (1999), herein referred to as “Chang.” Applicants traverse this rejection on the grounds that these references are defective in establishing a *prima facie* case of obviousness with respect to claims 1, 26, 36 and 42 and, thus, their dependent claims, for at least the following reasons.

As provided in 35 U.S.C. §103:

A patent may not be obtained ... if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains ... (Emphasis added)

Thus, when evaluating a claim for determining obviousness, all limitations of the claim must be evaluated. However, Uppala and Chang each independently fail to teach or suggest determining splats in the context of any of the currently-pending independent claims, whether such splat determination is with regard to leaf node splats, non-leaf node splats, splats based on scalar data corresponding to leaf nodes, or splats based on other splats of lower hierarchy. Therefore, the combination of Uppala and Chang necessarily fails to teach or suggest each and every element recited in any one of the independent claims and, thus, their dependent claims. Consequently, the combination of Uppala and Chang fails to support a *prima facie* case of obviousness, and the explicit terms of §103 cannot be met. Accordingly, Applicants respectfully request the Examiner withdraw the §103 rejection of claims 7, 18, 28, 39-41 and 48-50.

Conclusion

All matters set forth in the Office Action have been addressed. Accordingly, it is believed that all claims are in condition for allowance. Favorable consideration and an early indication of allowability are respectfully requested.

Should the Examiner deem that an interview with Applicants' undersigned attorney would expedite consideration, the Examiner is invited to call the undersigned attorney at the telephone number indicated below.

Respectfully submitted,



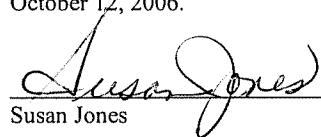
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Susan Jones